the Mecheleciv

Volume 26 October — 1967 No. 1

THE GEORGE WASHINGTON UNIVERSITY

OCTOBER 196

If you think oceanography at Westinghouse is a dry subject, you may be all wet.

Practically everybody in our Underseas Division takes to the water now and then. Like these engineers at the test pool in our new Ocean Research and Engineering Center on Chesapeake Bay.

Diving at Westinghouse is all in a day's work—on projects like deep-submergence systems, manned submersibles, sonar and underwater weapons.

Ocean engineering is just one of many areas at Westinghouse that need your talents, your capabilities, your interests. So what can you do about it? Talk to the Westinghouse recruiter when he visits your campus. Or write to Luke Noggle, Westinghouse Education Center, Pittsburgh, Pennsylvania 15221.

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What's it like to engineer for a giant?

Depends on the giant. Actually, some giants are just regular kinds of guys. Except bigger.

And that can be an advantage.

How? Well, take Ford Motor Company. We re a giant in an exciting and vital business. We tackle big problems. Needing big solutions. Better ideas. And that's where you come in. Because it all adds up to a real opportunity for young engineering graduates like yourself at Ford Motor Company.

Come to work for us and you'll be a member of a select College Graduate Program. As a member of this program, you won't be just another "trainee" playing around with "make work" assignments.

You'll handle important projects that you'll frequently follow from concept to production. Projects vital to Ford. And you'll bear a heavy degree of responsibility for their success.

You may handle as many as 3 different assignments in your first two years. Tackle diverse problems. Like figuring how high a lobe on a cam should be in order to yield a certain compression ratio. How to stop cab vibration in semi-trailer trucks. How to control exhaust emmission.

Soon you'll start thinking like a giant. You'll grow bigger because you've got more going for you.

A network of computers to put confusing facts and figures into perspective.

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Special programs. Diverse meaningful assignments. Full responsibility. The opportunity to follow through. The best facilities. The funds to do a job right. No wonder 87% of the engineers who start with Ford are here 10 years later.

If you're an engineer with better ideas, and you'd like to do your engineering with the top men in the field, see the man from Ford when he visits your campus. Or send your resume to Ford Motor Company, College Recruiting Department.

You and Ford can grow bigger together.

Ford

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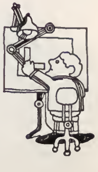

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ARTICLES

DEPARTMENTS

FRONTISPIECE

G.W.'s new building at 21st and Pennsylvania Avenue.

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MECHELECIV

THE ENGINEER'S ROLE IN SOCIETY

In this world of rapidly increasing entropy the contemporary engineer must give much more mature thought to the effect of his work and attitude on society. Due to the increasing influence of engineering work the modern engineer must reevaluate his relationship to the increasingly interdependent and complex world. Mr. R. E. Engdahl stated in a "Mechanical Engineering" article of a few years ago, ". . . the engineer, to be really professional, must carry constantly in mind a concern for what effects his creative efforts will have on his fellow man. Within his limited power to influence or act, he must speak out and inform and advise those who control the results of his work so that maximum benefit and minimum distress to mankind and his environment will result. . . . The practicing engineer, however skilled in applying science, who takes a narrow unprofessional view of the total consequences of his efforts contributes toward potential world disaster."

R. B. Smith, past-president of A.S.M.E., wrote in another recent "Mechanical Engineering" article – "Now 50 percent of all scientists in the United States are supported by national, state and local government funds, with their efforts patiently directed to goals determined by political reasoning and purpose. . . . Government appropriations for research and development have increased more than 200 times since 1940, until they now total $15 billion a year. This sum is three times greater than the development expenditure for the whole of the period of World War II, . . ." It is frightening to contemplate our increasingly complex technological society run by people not well versed in the technical sciences. By the very nature of their educational background those in government cannot know the implications or consequences of scientific advances. It is rather impossible to expect a liberal art major to obtain a working knowledge of science and engineering. It is imperative that the engineer and scientist develop an interest in and become involved in politics and humanity.

By the very nature of his profession the modern engineer is the interpreter of science for the rest of society. But more than simply an interpreter the modern engineer is the obvious motive force for shaping and guiding society in the coming technical age. Due to his development of a highly ordered, logical thought process, his education into the most complex technical modern disciplines, and his constant practice of the scientific method of efficient decision making; the modern engineer provides the potential for the future social leadership.

Saying in print that engineers are the future leaders of society may sound egotistical, but the modern engineer does have the necessary equipment to work minor miracles. With his logical mental processes, technical knowledge and decision making capabilities coupled with a sincere interest in and a knowledge of the needs and interests of society the engineer can indeed provide the necessary leadership. The first stirrings of this "new breed," to use a threadbare phrase, can be seen in the trend toward business managers with engineering backgrounds and the fantastic interest and increase in enrollment in Engineering Administration across the country.

The plaintive cry of educators, liberal arts majors and other such low life is . . . "engineers are too independent, specialized and too uncooperative." To be sure, an engineer has to crack his brain open to absorb all the magical formulae thrown at him. But to truly fulfill the definition of engineering, . . . the application of science to the efficient conversion of natural resources for the *benefit of mankind,"* the graduate engineer must become involved with the needs of society and continue his education not only in the technical fields but in the humanities as well. He must be proficient in his work but he cannot neglect the far reaching effect of his work.

The young engineer does indeed have the world by a soft and tender spot. Whether he squeezes for his own benefit or leads it gently into a better age for all mankind is a direct function of how well he fills the role of a true *man* as well as an engineer.

When life was easy . . . the end of the world was three blocks away (as far as mom would let you skate). Things have sure picked up since then . . . you can not only travel to the ends of the earth today—but to the moon tomorrow.

At Teletype we're working on tomorrow, and we need bright, aggressive individuals to work with us. We need the kind of kids that explored every inch of those three blocks yesterday—to explore every mile of the road to tomorrow — a tomorrow which will demand the best in message and data communications.

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CAMPUS NEWS

The three professional societies of the Engineering School are open to any engineering student with no restrictions on his QPI or class status. The purpose of a student society is two-fold: (1) bridge the gap between engineering education and engineering practice; and (2) acquaint the student with the many phases of engineering in his major field of study.

The student societies are planning a number of field trips, films, and speakers for this year. Any engineering student whether or not he is a member of the societies can attend these meetings and field trips.

However, the publications that one receives by being a member are worth the membership fee. They not only keep the student up-to-date on the technical state of the profession, but also on trends in education, jobs, salaries, and other related topics. In addition, you can be eligible to win prizes and money in the many student paper contests that the national organizations sponsor.

The professional societies hope that you will join and participate in their many activities. Their future activities are usually posted on the bulletin boards. You will not regret the time and effort you spend in supporting their activities.

ASME

The student chapter of the American Society of Mechanical Engineers held an organizational meeting and luncheon on September 29. It elected the following officers:

President: Peter Austin
Vice President: William Thomas Packard
Secretary: Jack Evans
Treasurer: John Curtis

The ASME executive committee decided to sponsor a number of field trips, speakers, and films for the year, the first being a field trip to Fairchild-Hiller in Germantown, Maryland on Nov. 2. On November 9, under the leadership of Peter Austin, ASME held a joint societies meeting with ASCE and IEEE. Mr. W. Leighton Collins, Executive Secretary of the American Society for Engineering Education, gave a most informative talk on the present status and future trends of engineering education.

During the month of November, ASME is sponsoring its 3rd Annual Pool Tournament with 32 faculty and students matched together. Watch the bulletin board for the final matches.

If you would be interested in joining ASME, contact any of the above officers or see the ASME faculty advisor, Professor Hyman.

ASCE

The student chapter of the American Society for Civil Engineers held its first organization meeting on October 4. The officers for this year are:

President: Larry Kastner
Vice President: Davis Berg
Secretary: Bruce Neuffer
Treasurer: Bob Keltie

On October 14th, ASCE showed a film "Essay on Bridges." ASCE was well represented at the joint societies meeting on November 9th. On November 16th, ASCE sponsored a briefing by the Washington Metropolitan Area Transit Authority who are designing and developing the rapid transit subway system for the Washington area.

If you want more information on ASCE, contact any of the above officers or see the ASCE faculty advisor, Professor Toridis.

IEEE

The student chapter of the Institute of Electrical and Electronics Engineers was inactive for a year. This year it has elected the following officers:

President: Harry Kuhn
Vice President: Lenny Sirota
Secretary: Martin Myers
Treasurer: George Stellar

On October 18th, it held a luncheon for engineering students. In addition, it helped sponsor the November 9th joint meeting with the other student societies.

Anyone interested in joining or helping IEEE should contact any of the above officers or Professor Meltzer, IEEE Faculty advisor.

ENGINEERS' COUNCIL

The Engineers' Council for 1967-1968 has been holding meetings on the first Wednesday of each month. The Council is composed of the following representatives:

Senior Representatives: Martin Myers (President)
Terry Lewis
Junior Representatives: Cappy Potter (V. President)
George Stellar (Treasurer)
Sophomore Representatives: John Huffman (Intramurals Chairman)
Carlton Greene
Freshman Representatives: Bill Pogson

ASME Representative: Peter Austin (Secretary)
ASCE Representative: Joe Castle
IEEE Representative: Lenny Sirota
Theta Tau Representative: James Wong
Sigma Tau Representative: Ronald Kopek
Tau Beta Pi Representative: John Cavanaugh (Assistant Secretary)
Student Council Representative: Stacy Deming
Engineers' Week Chairman: Spencer Hum
Davis-Hodgkins House Manager: Lou Kouts

THETA TAU

Theta Tau is a national engineering fraternity with 32 chapters located throughout the country.

—Continued on Page 18

PROLONGED SUBMERGENCE DIVING TECHNIQUES

A man in water is like a fish out of water. Men are adapted to breathing air and to enter the fishes' environment they must carry their own atmosphere and have some way of breathing it.

Anyone not closely familiar with diving tends to view self-contained breathing apparatus (scuba) as the solution to the problem. It is, for shallow depths, but in deep diving, the pressure of the water causes changes in the atmosphere the diver carries and the way he reacts to the atmosphere; the changes themselves create severe problems.

As an aside, pressure does not have a crushing effect on divers at depths reached to date because of two characteristics. Their bodies are largely water and breathing apparatus is so designed that the breathing mixture is subjected to the water pressure. The divers' respiratory systems, the only part of their bodies where collapse under pressure could occur, are therefore kept at the same pressure as water.

The brute force effects of pressure, then are not the immediate problem; other, more obscure physiological effects are the most troublesome in deep diving.

Six divers in mid-June, 1967 demonstrated for the first time that man can work effectively in the open sea at depths to 600 feet.

The prolonged submergence dives were made possible by the Cachalot diving system, developed by the Westinghouse Underseas Division. The Cachalot system consists of a submersible diving chamber, a surface chamber, and life support equipment in the form of modular components.

Cachalot, the French name of the deep-diving sperm whale, has been used in three major underwater operations. At Smith Mountain Dam in Virginia, divers did repair work at depths to 200 feet below the surface. Last summer in the Gulf of Mexico, teams of divers cleared wreckage of two offshore oil well platforms toppled by Hurricane Betsy in water 235 feet deep. Thereafter, divers worked on pilings for the new Jamestown Bridge in 160 feet of water in Narragansett Bay.

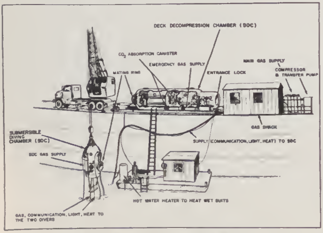


Figure 1. Diagram of Cachalot Diving System

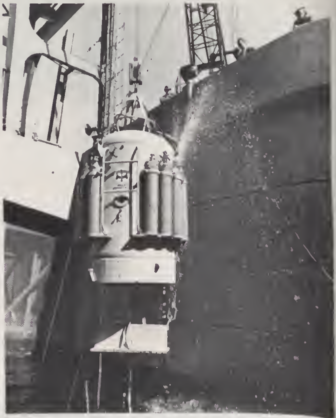


Figure 2. Submergible Diving Chamber

RAPTURE OF THE DEEP A HAZARD

Too much nitrogen absorbed in the body causes nitrogen narcosis, the legendary rapture of the deep. Divers have been known to blissfully swim away under the influence of this narcotic effect never to be heard from again. Reducing the amount of nitrogen in the gas mixture the diver breathes prevents the narcosis. Compressed air, which is about 80 percent nitrogen, is used at shallow depths, usually to the vicinity of 150 feet. From there on down, special mixtures that have little or no nitrogen in them must be used.

Nitrogen narcosis is similar to intoxication—so much so that divers have a rule of thumb for it they call Martini's law. Every 30 feet of depth, they say, is equivalent to the effect of one martini.

OXYGEN UNDER PRESSURE A HAZARD

Life-supporting oxygen becomes toxic when the amount absorbed by the body becomes significantly more than that usually taken on in the atmosphere at earth-surface pressures.

Oxygen toxicity in deep diving is explained by the compressibility of gases. Boyle's law states that the volume of a gas decreases in proportion to the pressure exerted upon it if the temperature is kept constant. This means that the deeper a diver goes, the more his breathing gas will be com-

pressed. For example, although a diver breathes in the same mass of air at 200 feet under water as he would at the surface, the density of this mass is seven times as great (the pressure at 200 feet is about 100 pounds per square inch or seven atmospheres). A diver breathing compressed air at 200 feet would therefore be taking on seven times as many oxygen molecules as he does at the surface. This amount can be toxic. Thus the amount of oxygen in a diver's breathing mixture is varied with depth to eliminate the possibility of oxygen toxicity.

DECOMPRESSION ESSENTIAL TO AVOID "THE BENDS"

The bends, also called decompression sickness or caisson disease, is one of the most respected hazards of diving. It occurs when gas bubbles form in the body, restricting blood flow. This can cause convulsions, severe pain, especially at the joints, injury to body tissues. Sometimes, the effects are severe enough to result in death.

The gas, which is absorbed by the body as the pressure increases with depth, forms bubbles when the pressure on the diver is lessened too quickly. It can happen when divers come up without stopping from even shallow depths, depending on the time they have been submerged. The gas rushes out of the body's tissues much like the carbon dioxide comes out of solution when a bottle of carbonated beverage is opened and starts to fizz. Bubbles of the gas form and collect at turns or narrow points in the blood vessels such as joints.

If the pressure on a diver is reduced slowly by proper decompression, either through ascending in stages or in a decompression chamber, the gas in the diver's body tissues comes out slowly; it remains dissolved in the blood until expelled through the lungs without forming the damaging bubbles.

Decompression tables have been formed to give the safe rate of decompression taking into account the variables of depth, composition of the gas mixture the diver has been breathing, and the length of time he has been down under pressure. These tables show that the deeper a diver goes, the longer it will take him to decompress. For example, a

Figure 3. Divers at Work

PETER AUSTIN is a senior working toward a B.M.E. degree who, rather uniquely, has received a B.A. in Political Theory from Georgetown University. He has been involved in campus activities as Chairman of ASME, Secretary of the Engineer's Council, and member of the Editorial Board of MECHELECIV Magazine. He expects to spend about four years in the Navy, and then pursue a career as a consulting engineer.

diver that spends 20 minutes at a depth of 200 feet on a gas mixture of helium and oxygen must spend an hour in decompression.

That is the crux of the decompression dilemma in conventional diving. In order for a diver to get any real work done, he must spend more than a few minutes at the working depth. But he can't be kept at great depths very long since he has to devote much of his diving time to decompression.

PROLONGED SUBMERGENCE RESOLVES THE DECOMPRESSION DILEMMA

In prolonged submergence, divers are kept under pressure for a number of days. They eat, sleep and work under pressure. This technique, first proposed by U. S. Navy Captain George Bond, M.D., was used in the French Conself and U.S. Navy Sealab experiments. In Conself III, French oceanauts under the leadership of the famous underseas explorer Captain Jacques Yves Cousteau lived for 24 days at a depth of 330 feet. Three teams of United States aquanauts, including astronaut M. Scott Carpenter, spent 15 days at a depth of 205 feet with two 19-minute dives to a depth of 300 feet.

Cachalot represents the current state of the art in practical prolonged submergence diving equipment. It consists of two pressure chambers, one that stays on the surface and is called the deck decompression chamber, and another chamber called the submersible diving chamber. The diving chamber is used to take the divers from the deck chamber to the working depth. The divers are at all times kept under almost the same pressure they experience at the working depth. In the Smith Mountain Dam project, the working depth was at one point 200 feet. This meant that the divers had to be kept under a pressure of about 100 pounds per square inch which is about seven atmospheres. Four divers, two teams of two each, remained under pressure for a week.

After leaving the submersible diving chamber, the divers are able to work from five to six hours. With conventional diving techniques, a diver can work at a depth of 200 feet from a few minutes to half an hour, depending on the type of equipment he is using. The diver must then begin his decompression cycle which takes an hour.

As the example of the Cachalot shows, the decompression dilemma in deep diving is resolved by prolonged submergence.

PROLONGED SUBMERGENCE DIVING IS SAFE

The safety of prolonged submergence is as important as its time- and cost-saving features. Diving is one of the world's most hazardous nonmilitary occupations. Anything that reduces the hazard is welcomed in all quarters.

Simply by its presence near the diver, the diving chamber adds immeasurably to the man's safety—and his peace of mind. If his breathing apparatus should malfunction, if

—Continued on Page 18

SUPER E

(the super engineer)

Super E, courageous student and special whiz who knows all and sees all, has finally come to our campus to alleviate oppression and apathy. He has come to the School of Engineering and Applied Science from the most recently constructed one room school in West Virginia. Super is here through an unfortunate event which happened one day as he was waiting at welfare office number 172. Super was standing in line just seconds before the woodchuck stew pot at the Salvation Army building right next door exploded. Super, the only survivor, was saved when the welfare officer, sensing what was about to transpire, grabbed Super by the back of his collar and the seat of his trousers, ejecting him through the laundry chute and into a waiting garbage truck which pulled away only nanoseconds before the disaster.

From this point Super wandered aimlessly until he noted one day, in an old copy of Mecheleciv that was lying in Hestibub's Pool Palace and Greasy Spoon (in Anawalt, W. Va.), that GW was the true home of the playboy engineer. Upon his arrival at GW he went straight to see the Chief (at the Mecheleciv office). The Chief, after making some very astute observations, hired Super on the spot. Super seems to be just what Mecheleciv needs, for ever since he was hired he has been putting his thoughts on paper. First the stationery, then the ditto paper, and now finally the rolled paper that is supplied by the University which seems to be best suited to Super's needs.

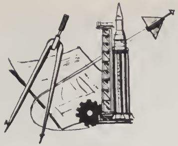
This month, in order to introduce the freshmen to the proper campus attire, Super has decided to devote his column to a fall fashion show. In future months Super will be glad to answer your questions and to publish articles of interest to the aspiring young engineer.

For those formal occasions this winter, our model sports a nifty olive drab poncho (available nationally from Uncle Sam and locally from Smelly Surplus for $3.97). To go with the poncho our model wears a matching shirt and sock set available at better sports stores everywhere. The sports store at which the shirt and sock set was purchased was all out of the knee length trousers, hence the towel (available in detergent boxes everywhere).

Our host wears his best at home attire. Although one might not feel very "at-home" in it when he first gets it, one soon grows to love it. The jacket comes in olive drab and dirty brown, has all kinds of neat pockets, and comes in two sizes—too large and too small (available at Smelly Surplus for $11.67).

For those less formal occasions the deep blue one piece outfit with chest patch adds distinction and a feeling of belonging to the wearer. This particular design comes to us from Sweat More Work Clothes and may be purchased at the Uninformed Uniform Company for $12.72. To top of this outfit our model wears a custom hat from Ozark Industries of Smog, West Virginia (note the badge of identity which is an official Super E code wheel.)

TECH NEWS



Edited by James Wong

X-24A ROCKET PLANE

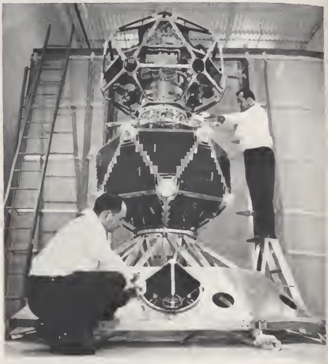
This rocket plane develops aerodynamic lift from the shape of its body. The supersonic wingless lifting body was released from the cradle of a bomber at 45,000 ft., flew to 100,000 ft. and returned to land at an airfield runway in just four minutes. The craft attained a flight speed of 1350 mph and had a landing speed ranging from 160 mph to 240 mph. The plane body was made at Martin-Marietta's Baltimore Division and most of the electrical power is provided by an ESB Exide silver-zinc battery.

FUSED QUARTZ ASTRONOMICAL TELESCOPIC MIRROR BLANK

The 15-ton mirror blank, 23 and a half inches thick and 158 inches in diameter, was produced by General Electric for the giant reflecting telescope being built at the Kitt Peak National Observatory near Tucson, Arizona. The telescopic mirror blank was made by fusing together several hundred hexagonal-shaped quartz ingots at 3300°F. Before installation, the mirror blank must be polished and the surface shaped to proper accuracy which will take up to two and a half years to complete. By 1972, the telescope will be installed and will be the largest in the world with a fused quartz mirror.

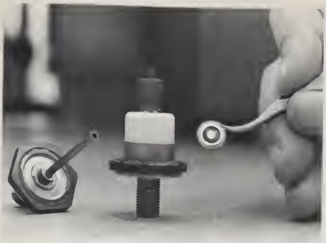
VELA NUCLEAR DETECTION SATELLITES

The satellites are designed by TRW Systems to detect nuclear tests conducted near the earth's surface and in deep space. The Velas feature earth stabilization and are patrolling outer space at a 60,000 nautical mile altitude. Two Velas satellites are launched at a time to orbit opposite sides of the Earth and contain X-ray, gamma, and neutron detectors. The satellites are powered by solar cells and two rechargeable nickel-cadmium batteries for service during eclipses, are designed for ranges up to 75,000 miles and are capable of storing 60,000 bits of scientific and housekeeping information. Some of these satellites have already been launched and are presently circling the earth.



LASS

LASS is a Light-Activated Silicon Switch used to switch large blocks of electricity with the invisible light from a laser no larger than the head of a pin. The infrared light used as a trigger comes from a solid-state laser made of gallium arsenide (GaAs) and thereby implying that the switch cannot be turned on by sunlight or ordinary artificial light. The working element in LASS is a four-layer silicon wafer structured in such a manner that a large area of the top layer (cathode) is flooded directly with infrared light, which is of the proper frequency to penetrate through the silicon material and make it electrically conducting. The LASS can switch full loads in less than one-half microsecond and the built-up rate for current is at least 400 amperes per microsecond. This switch is the first high-power silicon switch to



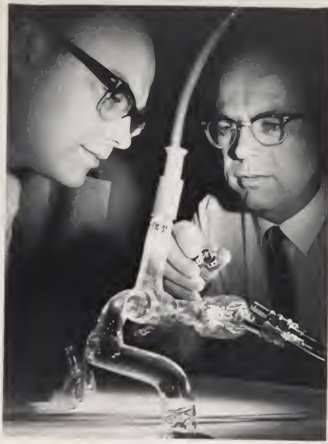
be activated by light and was developed by Westinghouse Research Laboratories.

MOL

MOL for the USAF's Manned Orbiting Laboratory is now in its second phase of developments with contracts let out for the two-man spacecraft. The spacecraft will allow two research pilots to work in the laboratory for as long as 30 days. The laboratory will be launched from Vandenberg AFB, Calif. by a Titan IIIM booster and a Gemini B ferry vehicle will carry the men from earth to the spacecraft. The total project will cost approximately $2.2 billion and is divided among three major contractors and the USAF.

HOLOGRAMS BY COMPUTER

IBM computer creates mathematically holograms of "objects" that exist in concept rather than in physical reality. At the present, the computer program has been restricted to two-dimensional objects for research simplicity but further work is being done to produce 3-D holograms. From this, an engineer could obtain a full view of the object under design without actually building the physical object or drawing it by hand. The output, a graphic plotter like those used in tracing weather maps, converts the digital hologram, that was desired as the printed output, into a visible hologram on a sheet of translucent material. The plotter records the data in 32 different shades of gray under the computer control. Observation is obtained by photographing the plotted hologram and then observing it under a coherent laser light.



"MINI-Q" SPECTROMETER

Mass spectrometer developed by General Electric is an analytical instrument that uses electric or magnetic fields to sort charged atoms and molecules (ions) according to their mass. This spectrometer is the size of a golf ball and produces a three-dimensional quadrupole electric field which traps ionized gases selectively according to their masses. A basic use of this product is aboard a space probe where it would sample and identify the gases in interplanetary space, determine the atmospheres of distant planets, or analyze rarefied gases at the surface of the moon.

MECH

MISS . . .

This month's Mech Miss, Isabel Meyer, comes to us from Cuba. On campus she is active in the International Student Society Big Sis, and Student Council Committees. She is a sophomore with a major in Art History and a member of Delta Gamma Sorority.

—Castro No!
Isabel Si!

Isabel
Meyer

CAMPUS NEWS—Continued from Page 8

The purpose of Theta Tau is to promote high standards of professional interest among undergraduate engineers and to unite them in the strong bond of fraternal friendship. As such, Theta Tau does not intend to compete with social fraternities, nor are membership requirements such that it competes with academic honor societies. Membership is extended by invitation to those students who have successfully completed at least one semester, or have no less than six months remaining prior to graduation. These students should have demonstrated themselves to be sociable and practical, and displayed an interest in fraternal ideals.

Gamma Beta Chapter of Theta Tau has elected the following officers for this year:

Regent: James Wong
Vice Regent: Larry Kastner
Scribe: Joel Marenberg
Treasurer: Pat Cadwallader

Theta Tau this year held a brief orientation meeting with the incoming freshmen class. On October 11th, it sponsored a free lunch for all students and faculty and on October 14th, it held a mixer party in the Davis-Hodgkins House. Under player-coach Doug Jones, Theta Tau's Intramural football team is guaranteed a winning season with a 3-1-1 record so far.

TAU BETA PI

Tau Beta Pi is a national engineering honor society founded to honor the scholarship and exemplary character of undergraduates in engineering and alumni in the field of engineering. It has chapters in 120 colleges and universities, 31 alumni chapters, and over 130,000 initiated members.

Candidates are eligible from:

(1) undergraduate students in the upper 1/8 of the junior or upper 1/5 of the senior class and showing exemplary character.
(2) alumni of the college whose chapter may consider them, who met the scholastic requirements as undergraduates.
(3) alumni of a college other than the one whose chapter may consider them, who met the scholastic requirements as undergraduates.
(4) engineers of high attainment in the profession, regardless of college attended, undergraduate scholastic record, or educational background.

Elections and initiations are normally held by the undergraduate chapters twice a year. Membership in Tau Beta Pi is limited to men although women are eligible under the same rules for award of the Woman's Badge.

The George Washington University Chapter is the District of Columbia Gamma Chapter and Professor Fox is the Faculty advisor.

The officers of Tau Beta Pi are:

President: Edward Murray
Vice President: William Lemeshewsky
Treasurer: Harry Kuhn
Correspondence Secretary: Martin Myers
Recording Secretary: Jan Friedlander

SIGMA TAU

Sigma Tau is a national engineering honorary fraternity. Its purpose is not only to give recognization, but to combine the efforts of those student leaders of S.E.A.S. that have proven themselves scholastically, practically and sociably, i.e. those qualities which are related to the promise of professional attainment.

Its members must be at least a Junior and rank in the top third of their respective class. They must obtain the endorsement of at least three active members of the S.E.A.S. Faculty while receiving no negative vote from any Faculty member.

At the George Washington University, the Xi Chapter of Sigma Tau has the following officers:

Faculty Advisor: Dr. George Lea
President: Burton Goldstein
Vice President: Tim Cavanaugh
Secretary: Ric Barton
Treasurer: Ric Blumberg
Historian & Pledgemaster: Jan Friedlander

DIVING TECHNIQUES—Continued from Page 11

his face mask should be damaged or ripped off, if a shark appears, the diver can swim the short distance to the diving chamber and there be in complete safety. Any one of countless things can happen to a diver in the inhospitable underwater environment, especially at a couple of hundred feet under the surface. Without the protection of a chamber, the diver has nowhere to go but up. It takes about 3 minutes to ascend 200 feet and if the diver makes it to the surface from that depth, he'll get a case of the bends that could be fatal.

In the Cachalot system, the all-important gas mixture content is continually and precisely controlled by the Krasberg oxygen partial pressure control, an oxygen sensing and controlling device. If, for example, the gas mixture in the deck chamber changes in an unwanted manner, the Krasberg unit adjusts it. If a diver's breathing apparatus would for some reason drop supplying the right amount of oxygen, the sensor installed in the diving rig would signal the surface support crew and they would instruct the diver over their intercommunications line to get into the diving chamber.

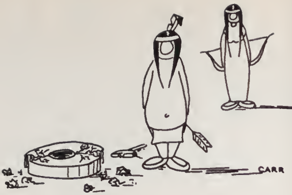
Another safety feature of prolonged submergence diving is the drastic reduction in the number of times a diver must undergo decompression on a particular job and the precise control over decompression that the surface crew is able to maintain. In addition to having all the controls and monitoring equipment incorporated in a deck chamber such as the Cachalot's, the divers are where they can be seen and heard by the support crew all during decompression. None of the decompression cycle is spent in the water.

The safety aspect of prolonged submergence has been amply demonstrated by Cachalot's record. To date, the Westinghouse system has logged over 5000 hours of working time—with divers at depths ranging from 70 to 235 feet doing useful work—without a single disabling accident.

DEEPER PROLONGED SUBMERGENCE FEASIBLE

Much deeper dives are possible with the prolonged submergence technique. Westinghouse has shown in diving experiments that it can work just as efficiently with its Cachalot system at 600 feet as it did at 200 feet. Confident it can easily go to 800 feet, the company has designed and is now building a prolonged submergence system for that depth.

THE SHAFT



When Jane returned from a ride, her mother noticed that one of her shoes was muddy.

"Why is just your right shoe muddy and not your left?" she asked.

"I changed my mind," Jane answered simply.

* * *

A golfer rushed up to the foursome and said: "Pardon me, do you mind if I play through? I've just received word that my wife's been taken seriously ill."

* * *

Did you hear about the easy job that belly dancers have?

They just stand around and twiddle their tums.

* * *

Did you hear about the new medical discovery?

Frozen band-aids for cold cuts.

* * *

Famous last words: "Hell, he won't ask us that."

* * *

While drinking his seventh beer in the Club, a man noticed a girl in a booth in the rear with a large white duck. He sauntered over and spoke: "Pardon me, but I just can't help wondering. What are you doing with that pig?"

The girl coldly replied, "This isn't a pig. It's a duck."

The man returned her icy look tenfold and replied in his most lofty manner: "I was speaking to the duck."

* * *

An impatient old lady making a trip by bus became irritated at the many stops. "Such a slow bus," she snapped. "I believe we stop at every telephone pole."

"Why not, lady?" replied the driver. "This bus is a Greyhound."

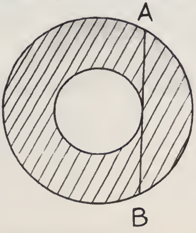
* * *

"Tommy," asked the teacher, "If I lay one egg on the table and two on the chair, how many will I have all together?"

"Personally," answered Tommy, "I don't think you can do it."

* * *

In the diagram below, AB is a chord tangent to the little circle. If the length of the chord is 10 feet, what is the area between the circles—the shaded area?



Then there was the butcher who backed into the meat grinder and got a little behind in his orders.

* * *

Dressed as a pirate for Halloween, the small boy knocked on a door and was greeted by a matronly woman. "Aren't you a cute little pirate," she said. "But where are your buccaneers?"

To which the little boy replied: "Under my buccan hat."

* * *

Then there was the fellow who loved the beautiful cellist—especially when she was on her Bach.

* * *

The essence of humor is corn;

The main part of corn is the kernel;

A colonel stays a colonel if he's friends with the general.

A general remains a general if he's known in the Pentagon;

A Pentagon has five sides;

A page has four sides;

On some four-sided pages the writing runs out and a space filler is needed;

This is a space filler. . . .

These U.S. Air Force officers are getting what they want out of life. You can be one of them.

What are they doing? They are performing a job of importance. Hour after hour. Year after year. Many of them will serve for 20 or more years. The fruitful part of a man's life.

Will yours be fruitful and creative? Or just spent?

You're going to college to do something constructive, important. And you can be sure of it, in the U. S. Air Force.

Start now in the Air Force ROTC program on your campus. Your Professor of Aerospace Studies will explain the variety of career opportunities. Pilot. Navigator. Engineering. Science. Administration.

If you get in on it, you get paid to be part of the most exciting technological breakthroughs of all time. You'll become a leader, an officer in one of America's most vital organizations...the U. S. Air Force.

You can be part of the Aerospace Age when things are most exciting... at the beginning. While you serve your country, the whole universe will open up to you.

There's a 2-year Air Force ROTC program, and the 4-year program has new attractive financial assistance provisions.

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